Paper No. 17

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte YINGJIAN CHEN, YUGANG WANG, FRANCIS LIU, XIZENG SHI, KYUSIK SIN and HUGH CRAIG HINER

Appeal No. 2005-0534
Application No. 09/933,508

ON BRIEF

Before MCQUADE, NASE and BLANKENSHIP, Administrative Patent Judges.

MCQUADE, Administrative Patent Judge.

DECISION ON APPEAL

Yingjian Chen et al. originally took this appeal from the final rejection of claims 1, 2, 4 through 10 and 12 through 24. As the appellants have since canceled 2, 10 and 20, and amended claims 1, 9 and 17, the appeal now involves claims 1, 4 through 9, 12 through 19 and 21 through 24, all of the claims currently pending in the application.

THE INVENTION

The invention relates to "electromagnetic transducers for information storage and retrieval systems, such as disk or tape drives" (specification, page 1). Representative claim 1 reads as follows:

1. A device for recording information on a relatively-moving media, the device comprising:

a body having a leading end, a trailing end, and a media-facing surface,

a first soft magnetic layer disposed in said body and terminating at a first pole tip disposed adjacent to said media-facing surface,

a second soft magnetic layer disposed in said body and terminating at a second pole tip disposed adjacent to said media-facing surface, said second pole tip having a leading edge and a trailing edge that bound a shape of said second pole tip, said trailing edge disposed closer than said leading edge to said trailing end,

wherein said first and second soft magnetic layers are magnetically coupled in a part of said body distal to said media-facing surface,

said second pole tip is separated from said first pole tip by at least a micron,

said first pole tip has an area substantially larger than that of said second pole tip,

said trailing edge is substantially larger than said leading edge, and

said second soft magnetic layer has a substantially trapezoidal cross-sectional shape at a location at least one micron from said second pole tip that is substantially equal to said shape of said second pole tip.

THE PRIOR ART

The references relied on by the examiner as evidence of obviousness are:

Shukh et al. (Shukh)	6,504,675	Jan. 07, 2003
Khizroev et al. (Khizroev)	6,513,228	Feb. 04, 2003

THE REJECTIONS

Claims 1, 4 through 9, 12, 14 through 19 and 22 through 24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Shukh.

Claims 13 and 21 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Shukh in view of Khizroev.

Attention is directed to the main and reply briefs (Paper Nos. 12 and 14) and the answer (Paper No. 13) for the respective positions of the appellants and the examiner regarding the merits of these rejections.[1]

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[1] Contrary to the statement on page 2 in the main brief, the amendment filed subsequent to final rejection canceled claim 20 rather than claim 19. Also, the record indicates that the inclusion of claim 13 in the statement of the first rejection in the answer was inadvertent.

DISCUSSION

I. The 35 U.S.C. § 103(a) rejection of claims 1, 4 through 9, 12, 14 through 19 and 22 through 24 as being unpatentable over Shukh

Shukh pertains to "heads for high track density perpendicular magnetic recording, and more particularly relates to writing poles of such heads which exhibit a suppressed effect of the skew angle on the width of the recorded track" (column 1, lines 15 through 19). For purposes of the appealed rejections, the examiner focuses on the perpendicular recording head shown in Figure 6, as understood in light of the perpendicular magnetic recording disk drive depicted in Figure 1 and the conventional perpendicular recording head illustrated in Figure 2. The following passage from the reference fairly summarizes the salient characteristics of the structure shown in Figure 6:

> [t]he head includes a leading opposing pole 21 and trailing write pole 22 spaced by a write gap 23. The cross sectional area of the opposing pole 21 is much larger than the cross sectional area of the write pole 22. This provides a low magnetization level of the opposing pole 21 at the ABS [air bearing surface] during recording and, as a result, prevents erasing information recorded on the adjacent tracks. The smaller cross-sectional area of the write pole 22 provides the write pole 22 with a very high level of pole magnetization at the ABS, and a high write field magnitude which exceeds the coercivity of the perpendicular media. The transitions recorded on perpendicular recording media with a soft magnetic underlayer produce the shape of the write pole 22 projection on the media plane. The trailing write pole 22 shown in FIG. 6 has a trapezoidal shape with a wide

> and flat top edge 24 and beveled sides 25. The canting angle Θ at the sides 25 may be greater than or substantially equal to the maximum skew angle of the head in a drive [column 3, lines 43 through 60].

As framed and argued by the appellants, the dispositive issue with respect to the rejection of independent claims 1, 9 and 17 is whether Shukh would have rendered obvious a device meeting the limitations in these claims requiring the second soft magnetic layer to have "a substantially trapezoidal cross-sectional shape at a location at least one micron from said second pole tip that is substantially equal to said shape of said second pole tip." The appellants' specification (see page 9) indicates that this feature prevents the formation of fringe fields for perpendicular recording that defocus the magnetic pattern on the media and does not necessarily result if the trapezoidal pole tip is formed by the problematic technique of focused ion beam etching of the media-facing surface. In essence, the appellants contend that the rejection of claims 1, 9 and 17 is unsound because Shukh, which admittedly discloses that write pole 22 (which corresponds to the second pole recited in the appellants' claims) has a trapezoidal shape at its air bearing surface tip, does not teach and would not have suggested that this pole has a substantially trapezoidal cross-sectional shape at a location at least one micron from the tip. In this

vein, the appellants submit that "[t]here is no depiction or description in Shukh et al. of the shape of the second soft magnetic layer [pole 22] away from the ABS" (main brief, page 4) and that "Shukh et al. do not indicate what shape a write pole [22] of that invention has except for '*at the air bearing surface (ABS)*.'" (main brief, page 5).

The appellants' position here is not persuasive. The Shukh reference certainly focuses on controlling the shape of the write pole at the ABS to suppress the so-called skew angle effect (see, for example, column 1, lines 65 through 67; column 2, lines 36 through 38; and column 3, lines 38 through 60), and expressly teaches that "the pole of the writer has a trapezoidal cross-section at the ABS" (column 2, lines 3 and 4). The reference also indicates, however, that the write pole itself has a trapezoidal cross-section (see the Abstract; and column 3, lines 56 through 58), and strongly implies that the write pole has the ABS cross-sectional shape for most, if not all, of its length (see column 2, lines 11 through 20; and column 3, lines 49 through 52). This implication is buttressed by the illustration in Figure 2 of the prior art write pole 12. Thus, contrary to the arguments advanced by the appellants, Shukh would have suggested a write pole 22 having a trapezoidal cross-section from its ABS tip through a significant portion of its length. Based

on the write pole cross-sectional width and length dimensions specified in the reference, the examiner has determined that Shukh would have suggested that the write pole has a substantially trapezoidal cross-sectional shape at a location at least one micron from the pole tip that is substantially equal to the shape of the pole tip as recited in claims 1, 9 and 17 (see page 5 in the answer). This determination is reasonable on its face, and does not amount to an erroneous "obvious to try" standard for obviousness as urged by the appellants (see page 6 in the reply brief).

Hence, the fair teachings, suggestions and inferences of Shukh justify a conclusion that the argued difference between the subject matter recited in claims 1, 9 and 17 and the prior art is such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art. We shall therefore sustain the standing 35 U.S.C. § 103(a) rejection of claims 1, 9 and 17 as being unpatentable over Shukh.

Claim 5 depends from claim 1 and requires the claimed device to comprise a magnetoresistive sensor disposed adjacent to one of the pole tips. As Shukh does not teach, and would not have suggested, this feature, we shall not sustain the standing 35

U.S.C. § 103(a) rejection of claim 5 as being unpatentable over Shukh.

Claims 6 and 14 depend from claims 1 and 9, respectively, and require the second soft magnetic layer to be magnetically coupled to the first soft magnetic layer with a third magnetically permeable layer. The examiner's conclusion that this subject matter would have been obvious rests on a finding that Shukh discloses such a third layer in Figure 2 (see page 6 in the answer). This finding springs from baseless conjecture rather than a sound evidentiary footing. Accordingly, we shall not sustain the standing 35 U.S.C. § 103(a) rejection of claims 6 and 14 as being unpatentable over Shukh.

Claims 7, 15 and 22 depend from claims 1, 9 and 17, respectively, and require the media or media layer to have an easy axis of magnetization substantially perpendicular to the media-facing surface. Given the admission in the appellants' specification (see page 2) that this feature is prior art in the field of perpendicular recording, the examiner's conclusion that the subject matter recited in claims 7, 15 and 22 would have been obvious in view of Shukh is well taken. We shall therefore sustain the standing 35 U.S.C. § 103(a) rejection of claims 7, 15 and 22 as being unpatentable over Shukh.

Finally, we shall sustain the standing 35 U.S.C. § 103(a) rejection of dependent claims 4, 8, 12, 16, 18, 19, 23 and 24 as

being unpatentable over Shukh since the appellants have not challenged such with any reasonable specificity, thereby allowing these claims to stand or fall with their respective parent claims 1, 9 and 17 (see In re Nielson, 816 F.2d 1567, 1572, 2 USPQ2d 1525, 1528 (Fed. Cir. 1987)).

II. The 35 U.S.C. § 103(a) rejection of claims 13 and 21 as being unpatentable over Shukh in view of Khizroev

We shall sustain the standing 35 U.S.C. § 103(a) rejection of dependent claims 13 and 21 as being unpatentable over Shukh in view of Khizroev since the appellants have not challenged such with any reasonable specificity, thereby allowing these claims to stand or fall with their respective parent claims 9 and 17 (see Nielson, supra).

III. Remand to the examiner

This application is remanded to the examiner to determine whether claims 5, 6 and 14 should be rejected under 35 U.S.C. § 103(a) as being unpatentable over Shukh in view of Khizroev. In making this assessment, the examiner should pay particular heed to Khizroev's disclosure of a perpendicular magnetic read/write head having (1) a magnetoresistive sensor 106 disposed adjacent one of its pole tips and (2) a yoke 150 connecting the top and bottom writer poles of the head.

SUMMARY

The decision of the examiner to reject claims 1, 4 through 9, 12 through 19 and 21 through 24 is affirmed with respect to claims 1, 4, 7- through 9, 12, 13, 15 through 19 and 21 through 24, and reversed with respect to claims 5, 6 and 14. In addition, the application is remanded to the examiner for further consideration.

In addition to affirming the examiner's rejection of one or more claims, this decision contains a remand. 37 CFR § 41.50(e) (effective September 13, 2004, 69 Fed. Reg. 49960 (August 12, 2004), 1286 Off. Gaz. Pat. Office 21 (September 7, 2004)) provides that

> [w]henever a decision of the Board includes a remand, that decision shall not be considered final for judicial review. When appropriate, upon conclusion of proceedings on remand before the examiner, the Board may enter an order otherwise making its decision final for judicial review.

Regarding any affirmed rejection, 37 CFR § 41.52(a)(1) provides "[a]ppellant may file a single request for rehearing within two months from the date of the original decision of the Board."

The effective date of the affirmance is deferred until conclusion of the proceedings before the examiner unless, as a mere incident to the limited proceedings, the affirmed rejections are overcome. If the proceedings before the examiner do not

result in allowance of the application, abandonment or a second appeal, this case should be returned to the Board of Patent Appeals and Interferences for final action on the affirmed rejections, including any timely request for rehearing thereof.

AFFIRMED-IN-PART AND REMANDED

JOHN P. MCQUADE)
Administrative Patent Judge)
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JEFFREY V. NASE) BOARD OF PATENT
Administrative Patent Judge) APPEALS
) AND
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